

## CLAIMS

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1 A system for preparing particles comprising:  
 a solution source comprising an effective ingredient;  
 a vessel for holding a cryogenic liquid; and  
 5 an insulating nozzle having an end and a tip, wherein the end of the  
 insulating nozzle is connected to the solution source and the tip is placed at or below the  
 level of the cryogenic liquid.

2. The system recited in claim 1, wherein the effective ingredient is a  
 pharmaceutical.

3. The system recited in claim 2, wherein the effective ingredient is chosen  
 from the group consisting of proteins, peptides, albuterol sulfate, terbutaline sulfate,  
 diphenhydramine hydrochloride, chlorpheniramine maleate, loratidine hydrochloride,  
 fexofenadine hydrochloride, phenylbutazone, nifedipine, carbamazepine, naproxen,  
 cyclosporin, betamethosone, danazol, dexamethasone, prednisone, hydrocortisone,  
 15 17beta-estradiol, ketoconazole, mefenamic acid, beclomethasone, alprazolam,  
 midazolam, miconazole, ibuprofen, ketoprofen, prednisolone, methylprednisone,  
 phenytoin, testosterone, flunisolide, diflunisal, budesonide, fluticasone; insulin, glucagon-  
 like peptide, C-Peptide, erythropoietin, calcitonin, human growth hormone, leutenizing  
 hormone, prolactin, adrenocorticotrophic hormone, leuprolide, interferon alpha-2b,  
 20 interferon beta-1a, sargramostim, aldesleukin, interferon alpha-2a, interferon alpha-n3,  
 alpha<sub>1</sub>-proteinase inhibitor; etidronate, nafarelin, chorionic gonadotropin, prostaglandin  
 E2, epoprostenol, acarbose, metformin, or desmopressin, cyclodextrin, antibiotics; and  
 the pharmacologically acceptable organic and inorganic salts or metal complexes thereof.

4. The system recited in claim 1, wherein the solution source further  
 25 comprises water, at least one organic solvent, or a combination thereof.

5. The system recited in Claim 4, wherein the organic solvent is selected  
 from the group consisting of water miscible solvents and non-water miscible solvents.

6. The system recited in Claim 5 wherein the organic solvent is selected from  
 the group consisting of ethanol., methanol, tetrahydrofuran, acetonitrile, acetone, tert-

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17. A particle produced by spray freezing into liquid comprising:  
a particle with a size ranging from 10 nm to 100  $\mu\text{m}$ .
18. The particle recited in claim 17, wherein the particle has a porosity of  
between 0 percent and 80 percent
- 5 19. The particle recited in claim 17, wherein the particle has a density between  
0.1 g/mL and 5 g/mL.
20. The particle recited in claim 17, wherein the particle has an aerodynamic  
size distribution between 0.05 micron and 0.1 mm.
- 10 21. The particle recited in claim 17, wherein the particle has a surface area of  
from 0.5  $\text{m}^2/\text{g}$  to 500  $\text{m}^2/\text{g}$ .
22. The particle recited in claim 17, wherein the particle has a contact angle  
against water of from 0 degrees to 120 degrees, preferably from 0 to 50 degrees.

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